PART 11: MAJOR EQUIPMENT LIST - 100 MLD MAILASANDRA STP

Sl. No.	Category*	Item	Type	Unit Process / Location	Min. Working Units	Min. Standby Units	Min. Installed Units	Min. Uninstalled shelf spares	Min. Total No. of Units (Installed+ Uninstalled)	Min. Capacity per unit	Capacity Units	Min. Pump/ Blower efficiency (%)	Min. Motor / Gas Engine efficiency (%)	Min. Requirements	Electrical Drive Type (CS/VFD)	Service (C/I)	STP Standby Gene-rator No of Working Units Connected	Biogas Engines No of Working Units Connected
A		**TSPS**																
1	A	Trash Screen	J-type Manual Coarse Bar Screen (SS316L)	TSPS	2	1	3	0	3	1.157	cum/sec			50mm, Bar thickness: 12mm, Angle of inclination of screen: 90deg., Minimum width of channel: 1.8m, Maximum SWD at peak flow: 0.8m, Bar cross section: Rectangular	CS	I	3	3
2	A	Mechanical coarse Screen with Screen washing and compactor	Multirake type (Front Rake/Back Rake) Mechanically raked bar screen (SS-316L) with Auto Jam Removal system	TSPS	2	1	3	0	3	1.157	cum/sec			Clear spacing between bars 20 mm, Bar thickness 6/12 mm with 40 mm width, Angle of inclination of screen 75 deg., Minimum width of channel 2.0 m, Maximum SWD at peak flows 0.8 m	CS	I	3	3
3	A	Screenings Conveyor	Belt/Screw	TSPS	1	0	1	0	1	As per vendor				Belt/Screw type conveyor system of stainless steel construction	CS	I	1	1
4	A	Macerator	Channel Grinder	TSPS	2	1	3	0	3	1.157	cum/sec			As per vendor suitable for the process condition.	CS	I	3	3
3	A	TSPS PUMP- Compartment 1	Submersible non-clog solids handling wet pit	TSPS	2	2	4	0	4	2,084	cum/hr	72	92		VFD	C	4	4
4	A	TSPS PUMP- Compartment 2	Submersible non-clog solids handling wet pit	TSPS	2	2	4	0	4	2,084	cum/hr	72	92		VFD	C	4	4
5	A	EOT Crane	Fully EOT (LT,CT,Lift)	TSPS	1	0	1	0	1	5	MT SWL				CS	I	1	1
6	A	Dewatering Pumps	Submersible non-clog solids handling wet pit	TSPS	2	2	4	0	4	20	cum/hr			2 nos per compartment	CS	I	1	1
B		**Mailasandra STP**																
I		**Headworks**																
1	A	Fine Screen	Multirake type Mechanically raked bar screen/Step screen (SS-316L) with Auto Jam Removal system	Headworks	3	1	4	0	4	0.772	cum/sec			Clear spacing between bars 6 mm, Bar thickness 4/12 mm with 40 mm width , Angle of inclination of screen 75 deg., Minimum width of channel 2.6 m, Maximum SWD at peak flows 0.8 m	CS	I	1	3
2	A	Screenings Conveyor	Belt/Screw	Headworks	1	0	1	0	1					Belt/Screw type conveyor system	CS	I	1	1
3	A	Grit Mechanisam	Vortex Type Grit Mechanism	Headworks	2	1	3	0	3	1.157	cum/sec			Dia=7.5 m	CS	C	1	2
4	A	Grit Washers and Classifiers	Integral inclined trough with Screw classifiers	Headworks	2	1	3	0	3	1.157	cum/sec				CS	C	1	2
5	A	Organic Return Pumps	Vertical	Headworks	2	1	3	0	3						CS	C	1	2
II		**Primary Clarifier zone for 100MLD STP**																
1	A	Primary Clarifier Mechanism	Rectangular Scrapper and chain Mechanism	Primary Clarifier	8	0	8	0	8					As per vendor .	CS	C	4	4
2	A	Primary Sludge Pumps	Submersible non-clog solids handling wet pit/Screw Pump	Primary Sludge Pumping Station	2	1	3	0	3	90	cum/hr	35	90	Minimum Primary Sludge Concentration 3 %	VFD	C	1	2
3	B	Monorail, Chainpulley block with Travelling Trolley	Monorail, Chainpulley block with Travelling Trolley	Primary Sludge Pumping Station	1	0	1	0	1	1	MT SWL							
4	A	Dewatering Pumps	Submersible non-clog solids handling wet pit	Primary Sludge Pumping Station	1	1	2	0	2	10	cum/hr				CS	I	1	1
5	B	Primary Scum Pumps	Submersible non-clog solids handling wet pit	Primary Scum Pit	1	1	2	0	2	20	cum/hr	40	90		CS	I	1	1
6	B	Monorail, Chainpulley block with Travelling Trolley	Monorail, Chainpulley block with Travelling Trolley	Primary Scum Pit	1	0	1	0	1	1	MT SWL							
7	B	Monorail, Chainpulley block with Travelling Trolley	Monorail, Chainpulley block with Travelling Trolley	Clarifier	4	0	4	0	4	1	MT SWL							
III		**AREATION ZONE for 100MLD**																
		ANOXIC ZONE-1																
1	A	Mixers	Submersible Mixer	Anoxic Zone-1	12	4	16	0	16	1667 m3/hr					CS	C	4	12
		ANOXIC ZONE-2																
2	A	Mixers	Submersible Mixer	Anoxic Zone-2	8	4	12	0	12	625 m3/hr					CS	C	4	8
		AERATION TANK																
3	A	Process Air Diffusers	Fine bubble membrane, tubular or disc,Fixed Diffuser material - PU/Silicon Membrane, SS316 pipe grid system	Aeration Tank	4 tanks	0	4 tanks	5% of installed	4 tanks	As per vendor				Max air flow per effective area (effective area for tubular diffusers is upper half only) - 70 Nm3/hr/m2 with 5% of Spares along with installed				

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4	A	Mixed Liqour Recycle Pumps	Submersible-Axial tubular type tube installed	Aeration Basin Effluent Channel	4	4	8	0	8	3,125	cum/hr	75	94		VFD	C	4	4
5	A	Motorised Monorail Hoist	Motorised Monorail Hoist (CT, Lift)	Aeration Basin Effluent Channel (MLR Pumps)	2	0	2	0	2	3	MT SWL				CS	I	0	2
6	A	Process Air Blowers	Single-stage centrifugal with dual-point (inlet guide vanes and outlet valve) control or Turbo Blower	Process Air Blower Building	3	3	6	0	6	14,000	inlet m3/hr	75%	92	14000 m3/hr at 20 Deg C and 1 atm	VFD	C	3	3
7	A	EOT Crane	Fully EOT (LT,CT,Lift)	Process Air Blower Building	1	0	1	0	1	5	MT SWL				CS	I	0	1
8	A	Aeration Tank Submersible Drain Pump	Submersible non-clog solids handling wet pit	Aeration Tank	1	1	2	0	2	150	cum/hr				CS	I	1	1
9	A	Cooling water circulation pump	As per vendor	Process Air Blower Building	1	1	2	0	2	As per vendor				As per vendor	CS	I	1	1
10	A	Cooling tower fan	As per vendor	Process Air Blower Building	1	0	1	0	1	As per vendor				As per vendor	CS	I	0	1
		DE AERATION TANK																
11	A	Mixers	Submersible Mixer	De Aeration Tank	1	1	2	0	2	350 m3/hr					CS	C	4	8
IV		**Secondary Clarification Zone**																
i		**Chemical Building**																
1	A	Alum Dosing Pumps	Hydraulic double diaphragm	Chemical Building	1	1	2	0	2	1,600.00	LPH				VS	I	1	1
2	B	Alum Dosing Tanks	GRP or HDPE	Chemical Building	2	0	2	0	2	As per vendor	cum							
3	A	Alum Solution Tank Mixers	AS per vendor	Chemical Building	2	0	2	0	2	As per vendor				As per vendor	CS	I	1	2
4	B	Monorail, Chainpulley block with Travelling Trolley	Monorail, Chainpulley block with Travelling Trolley	Chemical Building	1	0	1	0	1	1	MT SWL							
5	B	Safety Showers		Chemical Building	2	0	2	0	2									
ii		**Secondary Clarifier for 100 MLD STP**																
1	A	Secondary Clarifier Mechanism	Rectangular Scrapper and chain Mechanism	Secondary Clarifier	14	0	14	0	14	As per vendor					CS	C	7	7
2	A	Return Activated Sludge (RAS) Pumps	Submersible non-clog solids handling/Screw Pump	RAS Pumping Station	4	4	8	0	8	1,042	cum/hr	72	93	Design Secondary Settled Sludge Concentration is 1 %	VFD	C	4	4
3	B	Motorised Monorail Hoist	Motorised Monorail Hoist (CT, Lift)	RAS Pumping Station	1	0	1	0	1	3	MT SWL				CS	I	0	1
4	A	Dewatering Pumps	Submersible non-clog solids handling wet pit	RAS Pumping Station	1	1	2	0	2	10	cum/hr				CS	I	1	1
5	A	Secondary Scum Pumps	Submersible chopper with recirc valve	Secondary Scum Pit	1	1	2	0	2	20.00	cum/hr	40	90		CS	I	1	1
6	B	Monorail, Chainpulley block with Travelling Trolley	Monorail, Chainpulley block with Travelling Trolley	Secondary Scum Pit	1	0	1	0	1	1	MT SWL							
V		**Chlorination System**																
1	A	Chlorine Ton Cylinders	Steel (SA516 Gr 60)	Chlorine Building	8	8	16	0	16	900	kg							
2	B	Chlorine Cylinder Load Cell	Electronic type	Chlorine Building	1	0	1	0	1									
3	A	Chlorinators	Vaccum type-Gas Feed	Chlorine Building	2	1	3	0	3	25.00	kg/hr							
4	A	Chlorine Booster Pump	Horizontal Centrifugal End Suction Pump	Chlorine Building	2	1	3	0	3	30.00	cum/hr			@ 50 mwc head (min)				
5	A	Chlorine Ejector	Inline vacuum induction	Yard Piping	2	1	3	0	3	AS per vendor					CS	C	2	2
6	A	EOT Crane	Fully EOT (LT,CT,Lift)	Chlorine Building	1	0	1	0	1	3	MT SWL				CS	I	0	1
7	B	Caustic Storage Tank	GRP/HDPE	Adjacent to Chlorine Building	1	0	1	0	1	As per vendor								
8	A	Emergency Chlorine Scrubber with all pumps, blowers,mixers and accessories	Caustic wet chemical scrubber - Automatic	Adjacent to Chlorine Building	1	0	1	0	1	As per vendor				As specified by chlorine scrubber manufacturer,Neutralisation Scrubber system includes FRP scrubbing tower, Centifugal Blowers (1W+1S) and Poly proplene Pumps (1W+1S)	CS	I	1	1
9	A	Chlorine mixing Agitator	Turbine type,MOC:SS316L	Mixing chamber upstream of CCT	1	0	1	0	1	As per vendor								
10	B	Safety Showers		Chlorine Building	4	0	4	0	4									

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VI		**Thickener Feed Pumping system**																
1	A	Thickener Feed Pumps	Submersible non-clog solids handling/Screw Pump	Thickener Feed Pumping station	4	1	5	0	5	50	cum/hr	70	95		CS	C	1	4
2	A	Motorised Monorail Hoist	Motorised Monorail Hoist (CT, Lift)	Thickener Feed Pumping station	1	0	1	0	1	1	MT SWL				CS	I	0	1
3	A	Thickener Feed Sump Mixer	Submersible Mixer	Thickener Feed Pumping station	2	0	2	0	2	550	cum/hr				CS	C	2	2
VII		**Sludge Handling System**																
i		**Thickened Sludge handling System**																
1	A	Mechanical Thickener Unit	Gravity Belt Thickener	Thickened Sludge Pumping Station	4	1	5	0	5	50	cum/hr				CS	C	2	4
2	A	Poly Dosing Tank	GRP/HDPE	Thickened Sludge Pumping Station	1	1	2	0	2	As per vendor								
3	A	Poly Dosing Tank Mixer	As per vendor	Thickened Sludge Pumping Station	2	1	3	0	3	As per vendor				For 2.5 kg/hr polymer dose	CS	C	2	4
4	B	Poly Feeder	Gravimetric or volumetric "atomizing" eductor	Thickened Sludge Pumping Station	1	0	1	0	1	As per vendor						I		
5	A	Poly Dosing Pumps	Hydraulic double diaphragm	Thickened Sludge Pumping Station	4	1	5	0	5	400.000	LPH			@ 2 bar (min)				
6	B	Monorail, Chainpulley block with Travelling Trolley	Monorail, Chainpulley block with Travelling Trolley	Poly Dosing	1	0	1	0	1	1	MT SWL							
7	B	Monorail, Chainpulley block with Travelling Trolley	Monorail, Chainpulley block with Travelling Trolley	Thickener Unit	1	0	1	0	1	3	MT SWL					I		
ii		**Digester System**																
1	A	Digester mixing pumps	Horizontal Centrifugal End suction Pump/Screw Pump	Digester Building	3	3	6	0	6	575	cum/hr	75	92	Design digested sludge concentration of max 4.0% ; Head 20 mwc minimum	CS	C	3	3
2	A	Digester Feed Sump Mixers	Submersible Mixer	Digester Feed Sump	1	1	2	0	2	120	cum/hr			120 m3/hr @ 20 W/m3	CS	C	1	1
3	A	Digester Feed Pumps	Non-clog submersible in wet pit installation	Digester Feed Sump	1	1	2	0	2	30	cum/hr			30 m3/hr @ 20 mwc (min)	CS	C	1	1
4	A	Digester Recirculation Pumps	Horizontal Centrifugal End suction Pump/Screw Pump	Digester Feed Sump	3	3	6	0	6	80	cum/hr			80 m3/hr @ 20 mwc (min)	CS	C	3	3
5	A	Digester Heat Exchangers	Tube in tube	Digester Building	3	0	3	0	3	80	cum/hr			MOC:SS316		C		
7	B	Monorail, Chainpulley block with Travelling Trolley	Monorail, Chainpulley block with Travelling Trolley	Digester Building	1	0	1	0	1	2	MT SWL							
9	A	Hot Water Boilers	Flue-fire-tube vacuum hot water boiler with Dual fuel Burner (Biogas and Heavy Duty oil) & chimmney		1	1	2	0	2	As per vendor	kcal/hr			Including suitable water treatment facility		C	1	1
10	B	Monorail, Chainpulley block with Travelling Trolley	Monorail, Chainpulley block with Travelling Trolley		1	0	1	0	1	5	MT SWL							
11	A	Digester Hot Water Circulation pumps	Horizontal Centrifugal End suction Pump		3	3	6	0	6	26	cum/hr	70	90		CS	C	3	3
12	A	Heavy Oil Storage Tank	Above ground steel oil tank		2	0	2	0	2	As per vendor	cum							
13	A	Biogas Scrubbing System including all pumps, blowers, and accessories - standby units for all pumps and blowers Or Biological Scrubber			1	1	2	0	2	As per vendor				Required H2S of outlet gas is as per Engine & boiler vendor, 150 ppm or lower	CS	C	1	1
14	B	Hot Water Buffer Tank	MS Fabricated		1	0	1	0	1	As per vendor				MOC:MS Epoxy painted				
15	A	Boiler feed water treatment package			2	0	2	0	2	As per vendor								
16	A	Safety Devices-Flame arresters,Pressure relief valves,Duplex Filters,Moisture Traps,Flame Trap assembly etc.		Biogas piping system	1	0	1	0	1	As per vendor								
17	A	Gasholder Cover	Anaerobic Digester cum Gas Holder	Anaerobic Digester	3	0	3	0	3	As per vendor								

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18	A	Gas Holder Blower		Anaerobic Digester	1	1	2	0	2	375	cum/hr				CS	I	1	1
19	A	Dewatering Pumps	Submersible non-clog solids handling wet pit	Digester Building	1	1	2	0	2	10	cum/hr				CS	I	1	1
VIII		**Biogas Power Generation System**																
1	A	Gas Engine Generation Set	Biogas based Genset	Gas Generation Set and Electric Panel Building	1	1	2	0	2	900	kW		35	Derating of Engine as per vendor	CS	C		
2	A	Gas Engine Ancillary Equipment	Engine jacket water cooling circuit, Low temperature circuit, Engine Heat Recovery system,Heat Exchangers,DM Water System,Lube oil Circuit,Ventilation system etc.	Gas Generation Set and Electric Panel Building	1	0	1	0	1	As per vendor					CS	C	4	4
3	B	Biogas Flare	Flare Burner with Flare stack,pilot burner,Gas blower and ignition system complete	Biogas flare	1	0	1	0	1	375	cum/hr			Flare Burner with Flare stack,pilot burner,Gas blower and ignition system complete with Flame Arrestor,Flare structure,11 m height MSEP structurals with Ladder,Minimum 300 mm dia. SS 316 piping and valves,Pressure relief valve,Duplex Filters-300 microns,PVRV 8"(Pressure cum vaccum breather valve)with Flame arrestor,Moisture Trap,300 NB,Baffle type,Water capacity 50 Ltrs.MOC:SS316	CS	I	1	1
4	B	Monorail, Chainpulley block with Travelling Trolley	Monorail, Chainpulley block with Travelling Trolley	Gas Generation Set and Electric Panel Building	1	0	1	0	1	5	MT SWL							
5	B	Gas Scrubbing System	Two Stage Caustic Scrubber with mist and flame traps- no chemcial recovery or Biological scrubber	Gas Scrubbing Area	1	0	1	0	1	375	cum/hr				CS	I	1	1
6	A	Gas Collecting Blowers	As per vendor	Gas Scrubbing Area	1	1	2	0	2	375	cum/hr				CS	I	1	1
7	A	Gas Engine Feeding Blowers	As per vendor	Gas Scrubbing Area	1	1	2	0	2	375	cum/hr				CS	I	1	1
IX		**Centrifuge Building**																
1	A	Centrifuge Feed (Dewatering Influent, DWI) Pumps	Submersible non-clog solids handling/Screw Pump	Centrifuge Feed Pumping Station	1	1	2	0	2	40	cum/hr	36	92	Minimum Sludge Concentration 3 %	VFD	I	1	4
2	B	Monorail, Chainpulley block with Travelling Trolley	Monorail, Chainpulley block with Travelling Trolley	Centrifuge Feed Pumping Station	1	0	1	0	1	2	MT SWL							
3	A	Dewatering Centrifuges	Solid Bowl	Centrifuge Building	1	1	2	0	2	40	cum/hr			Minimum total capacity (all working units): 98 cum/h, 4873 Kg/h		I		
a)		Main Drive			1	1	2	0	2						VFD	I	1	4
b)		Back Drive			1	1	2	0	2						VFD	I	1	4
4		Centrifuge Feed sump Mixer	Submersible Mixer	Centrifuge Feed Sump	2	1	3	0	3	325	cum/hr			325 m3/hr @ 20 W/m3				
5	B	Dry Polymer Feeder	Gravimetric or volumetric "atomizing" eductor	Centrifuge Building	1	1	2	0	2	As per vendor	kg/min			For 2.5 kg/hr polymer dose				
6	B	Polymer Batch Tanks	GRP/HDPE	Centrifuge Building	1	1	2	0	2	As per vendor	cum							
7	A	Polymer Batch Tank Mixers	As per vendor	Centrifuge Building	1	1	2	0	2	As per vendor				As pet vendor	CS	I	2	10
8	A	Polymer Metering Pumps	Hydraulic double diaphragm	Centrifuge Building	1	1	2	0	2	300.00	LPH			@ 2 bar (min)	VS	I	2	5
9	B	Monorail, Chainpulley block with Travelling Trolley	Monorail, Chainpulley block with Travelling Trolley	Centrifuge Feed Pumping Station	1	0	1	0	1	2	MT SWL							
10	A	Dewatered Sludge Conveyors	Belt / Screw	Centrifuge Building	1	0	1	0	1						CS	I	1	1
11	A	Dewatered Sludge Hoppers	Cut Gate	Centrifuge Building	1	0	1	0	1	10	cum				CS	I	1	1
12	B	Dewatered Sludge Containers		Centrifuge Building	1	1	2	0	2	10	cum					I		
13	B	Motorised Monorail Hoist	Motorised Monorail Hoist (CT, Lift)	Centrifuge Building	1	0	1	0	1	5	MT SWL				CS	I	0	1
14	B	Safety Showers		Centrifuge Building	2	0	2	0	2									
15	A	Dewatering Pumps	Submersible non-clog solids handling wet pit	Digester Building	1	1	2	0	2	10	cum/hr							
X		**Plant drain system**																

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1	A	Plant Drain Pumps	Non-clog submersible in wet pit installation	Plant Drain Pump Station	1	1	2	0	2	310	cum/hr	70	92	310 m3/hr @ 20 mwc (min)	CS	I	1	1
2	B	Monorail, Chainpulley block with Travelling Trolley	Monorail, Chainpulley block with Travelling Trolley	Plant Drain Pump Station	1	0	1	0	1	1	MT SWL							
XI		**Plant Water system**																
1	B	Bore Well Pumps	Submersible		1	1	2	0	2	10	cum/hr				CS	I	1	1
2	A	Plant Water Pumps/Service Water Pumps	Non-clog submersible in wet pit installation	Plant Water Pump Station adjacent to CCT Outlet	2	1	3	0	3	125	cum/hr	70	92	125 m3/hr @ 20 mwc (min)	CS	I	1	3
3	B	Monorail, Chainpulley block with Travelling Trolley	Monorail, Chainpulley block with Travelling Trolley	Plant Water Pump Station	1	0	1	0	1	1	MT SWL							
XII		**Disc Filter**																
1	A	Disc Filter	Main drive Mechanism	Disc Filter Unit	3	0	3	0	3	1400	cum/hr			1400 m3/hr @ 8 m3/m2/hr flux	CS	I	1	3
2	A	Suction cleaning Pumps		Disc Filter Unit						As per vendor					CS	I	2	4
XIII		**Miscellaneous**																
i		**Ventilation System (Exhaust fan, Duct mounted axial fan, Airconditioning etc)**																
1	B	TSPS Pump Room		TSPS Pump Room	5	0	5	0	5									
2	B	TSPS Pump Switch Gear room		TSPS Pump Switch Gear room	4	0	4	0	4						CS	C		
3	B	Primary Sludge Pump Building		Primary Sludge Pump Building	4	0	4	0	4						CS	C		
4	B	Process Air Blower Building		Process air blower Building-A	5	0	5	0	5						CS	C		
6	B	Chemical Building		Chemical Building	4	0	4	0	4						CS	C		
7	B	RAS Pumping Station		RAS Pumping Station-Stream-A	4	0	4	0	4						CS	C		
8	B	Chlorine Building		Chlorine Building	6	0	6	0	6						CS	C	6	6
9	B	Thickened Sludge Pumps		Thickened Sludge Pumps	4	0	4	0	4						CS	C		
10	B	Digester Building		Digester Building	4	0	4	0	4						CS	C		
11	B	Boiler Building		Boiler Building	4	0	4	0	4						CS	C		
12	B	Centrifuge Building		Centrifuge Building	4	0	4	0	4						CS	C		
13	B	Engine room and Electrical Panel building		Engine room and Electrical Panel building	4	0	4	0	4						CS	C		
14	B	Admin, Lab Building		Admin, Lab Building	3	0	3	0	3						CS	C	3	3
15	B	SCADA , Control room Building	Duct Mounted Airconditioning System	SCADA , Control room Building	4	0	4	0	4	2	Ton				CS	C	1	1
ii	B	Fire Extinguishers for Plant	Portable type,media based on zone classification of usage	For Entire Plant	30	0	30	0	30									
iii	B	Pumps for Sampling and Service application		For Entire Plant	2	2	4	0	4					2 pumps at TSPS and 2 pumps at CCT Outlet	CS	I	0	0
iv	B	Automated Flow Weighted Composite Samplers		(1) Raw Sewage (2) Combined Primary Clarifier effluent (3) Combined Bio Reactor Effluent (4) Plant Effluent (after CCT)	4	0	4	0	6							I	3	3

Legend : CS = Constant Speed; VFD = Variable Frequency Drive; VS = Variable Speed
*** Type of Inspection Category (refer Volume 2)**
Head mentioned in the above list are bare minimum requirement and shall be finalized based on Detailed Engineering